

STRAWBERRY MINK CREEK WATER ASSOCIATION (PWS 6210017) SOURCE WATER ASSESSMENT FINAL REPORT

March 20, 2003



State of Idaho Department of Environmental Quality

Disclaimer: This publication has been developed as part of an informational service for the source water assessments of public water systems in Idaho and is based on data available at the time and the professional judgement of the staff. Although reasonable efforts have been made to present accurate information, no guarantees, including expressed or implied warranties of any kind, are made with respect to this publication by the State of Idaho or any of its agencies, employees, or agents, who also assume no legal responsibility for the accuracy of presentations, comments, or other information in this publication. The assessment is subject to modification if new data is produced.

Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency (EPA) to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the act. This assessment is based on a land use inventory of the designated assessment areas and sensitivity factors associated with the spring and the aquifer characteristics.

This report, *Source Water Assessment for Strawberry Mink Creek Water Association, Preston, Idaho*, describes the public water system (PWS), the boundaries of the zones of water contribution, and the associated potential contaminant sources located within these boundaries. This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. **The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.**

The Strawberry Mink Creek Water Association PWS (# 6210017) is a community drinking water system located in Franklin County. The water system consists of one spring, developed in 1957. The spring is located approximately three miles up Mink Creek Canyon from Highway 36 east of the community. The water from the spring is piped through a chlorinating facility and then delivered directly to the system by gravity feed. There is no storage. Pressure through the system averages about 60 pounds per square inch (psi) but can be as low as 30 psi. The water system currently serves 75 persons through 33 metered connections.

The potential contaminant sources within the delineation capture zones are cattle grazing outside the fenced spring area and Mink Creek. The cattle can contribute inorganic chemical (IOC) contaminants and microbial contaminants to the water system. The Mink Creek within 50 feet of the spring collection area can potentially add IOC contaminants, volatile organic chemical (VOC) contaminants, synthetic organic chemical (SOC) contaminants, and microbial contaminants to the aquifer system in the event of an accidental spill or release. A recreation trail is located above the spring. According to the water system, it is on private property and inaccessible to the public. The trail is overgrown with vegetation due to very little use. The potential contaminant sources identified within the delineated area may contribute to the overall vulnerability of the water source.

Final spring susceptibility scores are derived from heavily weighting potential contaminant inventory/land use scores and adding them with system construction scores. Therefore, a low rating in one category coupled with a higher rating in the other category results in a final rating of low, moderate, or high susceptibility. Potential contaminants are divided into four categories: IOCs (e.g., nitrates, arsenic), VOCs (e.g., petroleum products), SOCs (e.g., pesticides), and microbial contaminants (e.g., bacteria). As a spring can be subject to various contamination settings, separate scores are given for each type of contaminant.

For the assessment, a review of laboratory tests was conducted using the State Drinking Water Information System (SDWIS). Total coliform bacteria have been detected in the distribution system several times between November 1992 and February 2002. However, none of these detections have been confirmed. Additionally, no coliform bacteria have been detected in the spring water. Since the water from the spring is chlorinated and then piped directly to the first house instead of to a storage tank, there is some concern (according to the 2001 sanitary survey) that the chlorine has not had sufficient contact time with the water to adequately kill harmful bacteria before use. Chlorine should be in contact with the drinking water for at least 30 minutes to sufficiently eliminate the bacteria.

No SOCs or VOCs have been detected in the spring water. The IOCs fluoride, barium, chromium, and nitrate have been detected in the spring water but at concentrations below the maximum contaminant level (MCL) for each chemical, as established by the EPA. Traces of alpha and beta particles (radionuclides) have been detected in the distribution system.

Two Microscopic Particulate Analyses (MPAs) were completed to determine if the Strawberry Mink Creek spring is influenced by surface water. The first test was completed during a high water table period (May 29, 2002) and the second test was conducted during a low water table period (October 10, 2002). The relative risk rating for the high water MPA was 10 and the relative risk rating for the low water MPA was 4.

Generally, if a water system receives a score of 0 to 9, repeatedly, it is most likely not influenced by surface water. However, the high water relative risk rating was a 10, showing that at least one of the tests indicates that the spring is influenced by surface water. Two more MPA tests will need to be conducted to determine affirmatively that the spring is or is not influenced by surface water.

In terms of total susceptibility, the spring rated automatically high for IOCs, VOCs, SOCs, and microbial contaminants due to the Mink Creek that runs within 50 feet of the spring collection area. If this corridor is diverted or relocated to an area greater than 100 feet from the spring area, the susceptibility of the system will be lowered. System construction rated moderate, and potential contaminant land use scores were moderate for IOCs and low for VOCs, SOCs and microbial contaminants.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a “pristine” area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources. If the system should need to expand in the future, new well or spring sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use.

An effective drinking water protection program is tailored to the particular local drinking water protection area. A community with a fully developed drinking water protection program will incorporate many strategies. For the Strawberry Mink Creek Water Association, drinking water protection activities should first focus on correcting any deficiencies outlined in the sanitary survey (an inspection conducted every five years with the purpose of determining the physical condition of a water system's components and its capacity). The system may want to consider diverting Mink Creek to an area at least 100 feet away from the drinking water source to avoid potential contamination associated with this corridor. If the recreation trail is developed or receives more use, the water system should divert the trail to prevent contamination or impact to the spring source. A diversion terrace above the spring area should be constructed to divert surface water runoff away from the collection area. Additionally, the system needs to conduct two more MPA tests to determine if the spring is influenced by surface water. The Strawberry Mink Creek Water Association may need to establish communication with landowners to restrict cattle grazing to areas outside of the delineated area and upgradient of the spring area. Homeowners who receive water from the spring should be made aware of the risk of microbial contamination due to the inefficient contact time of the chlorine to the drinking water. As a solution to the contact time issue, the Strawberry Mink Creek Water Association may need to consider installing a storage reservoir or enlarging the pipeline that goes to the houses. To learn the most appropriate chlorinating measures for your water system, contact Barbara Jones, the Drinking Water Coordinator for the Department of Environmental Quality (DEQ) Pocatello Regional Office. As land uses within most of the source water assessment area are outside the direct jurisdiction of the Strawberry Mink Creek Water Association, collaboration and partnerships with state and local agencies and industry groups should be established and are critical to success. Educating homeowners and the public about source water will further assist the system in its monitoring and protection efforts.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan. Public education topics could include household hazardous waste disposal methods and the importance of water conservation. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Franklin Soil and Water Conservation District, and the Natural Resources Conservation Service.

A community must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (e.g., zoning, permitting) or non-regulatory in nature (e.g., good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Pocatello Regional Office of the Idaho Department of Environmental Quality or the Idaho Rural Water Association.

SOURCE WATER ASSESSMENT FOR STRAWBERRY MINK CREEK WATER ASSOCIATION, PRESTON, IDAHO

Section 1. Introduction - Basis for Assessment

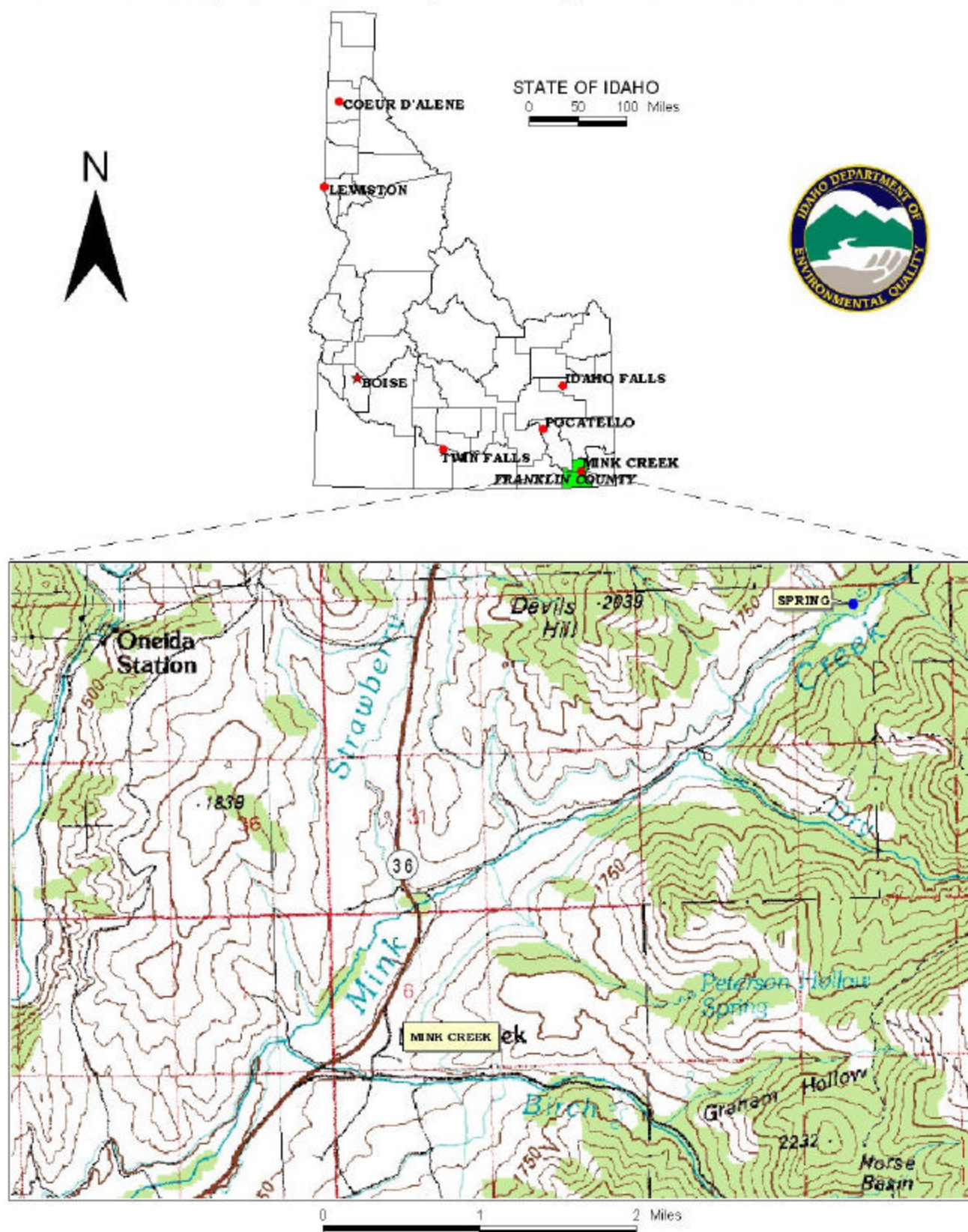
The following sections contain information necessary to understand how and why this assessment was conducted. **It is important to review this information to understand what the ranking of this assessment means.** Maps showing the delineated source water assessment area and the inventory of significant potential sources of contamination identified within that area are included. The list of significant potential contaminant source categories and their rankings used to develop the assessment also is included.

Level of Accuracy and Purpose of the Assessment

The Idaho Department of Environmental Quality (DEQ) is required by the U.S. Environmental Protection Agency (EPA) to assess over 2,900 public drinking water sources in Idaho for their relative susceptibility to contaminants regulated by the Safe Drinking Water Act. This assessment is based on a land use inventory of the delineated assessment area, sensitivity factors associated with the spring, and aquifer characteristics. All assessments must be completed by May of 2003. The resources and time available to accomplish assessments are limited. Therefore, an in-depth, site-specific investigation to identify each significant potential source of contamination for every public water supply system is not possible. **This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the public water system (PWS).**

The ultimate goal of the assessment is to provide data to local communities to develop a protection strategy for their drinking water supply system. DEQ recognizes that pollution prevention activities generally require less time and money to implement than treatment of a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The decision as to the amount and types of information necessary to develop a drinking water protection program should be determined by the local community based on its own needs and limitations. Wellhead or drinking water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

FIGURE 1. Geographic Location of Strawberry Mink Creek Water Association



Section 2. Conducting the Assessment

General Description of the Source Water Quality

The Strawberry Mink Creek Water Association PWS (# 6210017) is a community drinking water system located in Franklin County (see Figure 1). The water system consists of one spring, developed in 1957. The spring is located approximately three miles up Mink Creek Canyon from Highway 36 east of the community. The water from the spring is piped through a chlorinating facility and then delivered directly to the system by gravity feed. There is no storage. Pressure through the system averages about 60 pounds per square inch (psi) but can be as low as 30 psi. The water system currently serves 75 persons through 33 metered connections.

Total coliform bacteria have been detected in the distribution system several times between November 1992 and February 2001. However, none of these detections have been confirmed. Additionally, no coliform bacteria have been detected in the spring water. Since the water from the spring is chlorinated and then piped directly to the first house instead of to a storage tank, there is some concern (according to the 2001 sanitary survey) that the chlorine has not had sufficient contact time with the water to adequately kill harmful bacteria before use. Chlorine should be in contact with the drinking water for at least 30 minutes to sufficiently eliminate the bacteria.

No synthetic organic chemicals (SOCs) or volatile organic chemicals (VOCs) have been detected in the spring water. The inorganic chemicals (IOCs) fluoride, barium, chromium, and nitrate have been detected in the spring water but at concentrations below the maximum contaminant level (MCL) for each chemical, as established by the EPA. Traces of alpha and beta particles (radionuclides) have been detected in the distribution system.

Two Microscopic Particulate Analyses (MPAs) were completed to determine if the Strawberry Mink Creek spring is influenced by surface water. The first test was completed during a high water table period (May 29, 2002) and the second test was conducted during a low water table period (October 10, 2002). The relative risk rating for the high water MPA was 10 and the relative risk rating for the low water MPA was 4. Generally, if a water system receives a score of 0 to 9, repeatedly, it is most likely not influenced by surface water. However, the high water relative risk rating was a 10, showing that at least one of the tests indicates that the spring is influenced by surface water. Two more MPA tests will need to be conducted to determine affirmatively that the spring is or is not influenced by surface water.

Defining the Zones of Contribution – Delineation

The delineation process establishes the physical area around a spring that will become the focal point of the assessment. The process includes mapping the boundaries of the zones of contribution into time-of-travel (TOT) zones (zones indicating the number of years necessary for a particle of water to reach a flowing spring) for water in the aquifer. Washington Group International (WGI) was contracted by DEQ to define the PWSs zones of contribution. WGI used a calculated fixed radius method approved by the Source Water Assessment Plan (DEQ, 1999) in determining the 3-year (Zone 1B), 6-year (Zone 2), and 10-year (Zone 3) TOT zones for water associated with the “None” hydrologic province in the vicinity of the Strawberry Mink Creek Water Association. The computer model used site specific data, assimilated by WGI from a variety of sources including operator records and hydrogeologic reports. A summary of the hydrogeologic information from the WGI is provided below.

Hydrogeologic Conceptual Model

Graham and Campbell (1981) identified and described 70 regional ground water systems throughout Idaho. Thirty-four of these fall within the southeastern part of the state. The “None” hydrologic province, as defined in this report, includes all the area outside of the 34 regional systems in southeast Idaho. The smaller and more localized aquifers in the “None” province typically are situated in the foothills and mountains that surround and recharge the regional ground water systems.

The mountains and valleys within the “None” hydrologic province were formed during two events separated by approximately 50 to 70 million years (Alt and Hyndman, 1989, pp. 329 and 336). The overthrust belt of the northern Rocky Mountains was formed roughly 70 to 90 million years ago through the intrusion of granitic magma and a massive eastward movement of large slabs of layered sedimentary rocks along faults that dip shallowly westward (Alt and Hyndman, 1989, p. 329). This movement caused extreme folding and fracturing of the sedimentary and granitic rocks and, in many cases, left older formations lying on top of younger ones. Later Basin and Range block faulting broke up the largely eroded Rocky Mountains into large uplifted and downthrown blocks resulting in the present day northwest trending mountains and valleys seen throughout southeast Idaho. Paleozoic and Precambrian limestone, dolomite, sandstone, shale, siltstone, and quartzite are the predominant materials forming the mountains and probably compose the bedrock underlying the valleys between Salmon, Idaho on the north side of the Snake River Plain and Franklin, Idaho near the Utah/Idaho border (Dion, 1969, p.18; Kariya et al., 1994, p. 6; Bjorklund and McGreevy, 1971, p. 12; and Parlman, 1982, p. 9).

Ground water movement in the mountains is primarily through a system of solution channels, fractures and joints that commonly transmit water independently of surface topography (Bjorklund and McGreevy, 1971, p. 15; Dion, 1969, p. 18). Ralston and others (1979, pp. 128-129) state that the geologic structural features also can contribute to the development of cross-basin ground water flow systems. Ground water entering a geologic formation tends to follow the formation because hydraulic conductivities are greater parallel to the bedding planes than across them. Synclines and anticlines provide structural avenues for ground water flow under ridges from one valley to another.

The average annual precipitation in the mountains of southeast Idaho ranges from 20 inches on ridges near Soda Springs to over 45 inches on the Bear River Range (Ralston and Trihey, 1975, p. 7, and Dion, 1969, p. 11). The valleys receive an average of 7 to 10 inches annually (Donato, 1998, p. 3, and Dion, 1969, p. 11). Precipitation and seepage from streams are the primary source of recharge to the mountain aquifers (Kariya, et al., 1994, p. 18, and Parlman, 1982, p. 13).

Ground water discharge occurs as springs and seeps issuing from faults, fractures, and solution channels and as underflow to regional aquifers. The Bear River Basin in the far southeast corner of the state contains hundreds of springs issuing primarily from fractures and solution openings in the bedrock mountains (Dion, 1969, p. 47, and Bjorklund and McGreevy, 1971, pp. 34-35). Within Cache Valley many springs discharge from the valley-fill deposits (Kariya et al., 1994, p. 32).

There is little available information on the distribution of hydraulic head and the hydraulic properties of the aquifers in the “None” hydrologic province. No U.S. Geological Survey (2001) or Idaho Statewide Monitoring Network (Neely, 2001) wells are located in the areas of concern to provide information on ground water flow direction and hydraulic gradient or to aid in model calibration. The information that is available indicates that the hydraulic properties are quite variable, even within a specific rock type. Ralston and others (1979, p. 31), for example, present hydraulic conductivity estimates for fractured chert ranging from 2.2 to 75 feet per day (ft/day). Estimates for phosphatic shale are as low as 0.07 ft/day (unfractured) and as high as 25 ft/day (fractured).

Springs and Spring Delineation Methods

A spring is defined as a concentrated discharge of ground water appearing at the ground surface as flowing water (Todd, 1980). The discharge of a spring depends on the hydraulic conductivity of the aquifer, the area of contributing recharge to the aquifer, and the rate of aquifer recharge. PWS springs are generally perennial. Large seasonal changes in the discharge rates are an indication of a relatively shallow flow system. While most springs fluctuate in their rate of discharge, springs in volcanic rock (e.g., basalt) are noted for their nearly constant discharge (Todd, 1980).

Delineation of the drinking water protection area for a spring involves special consideration. Hydrogeologic setting is foremost among the factors that control the shape and extent of the capture zone. A spring resulting from the presence of a high permeability fracture extending to great depth will have a much different capture zone than a depression spring formed where the ground surface intersects the water table in a unconsolidated aquifer.

The Calculated Fixed Radius

The calculated fixed-radius method was used for delineating capture zones for PWS springs located in areas with a general lack of hydrogeologic data. The fixed radii for the 3-, 6-, and 10-year capture zones were calculated using equations presented by Keely and Tsang (1983) for the velocity distribution surrounding a pumping well. It is assumed that the majority of PWS springs issue from sedimentary rock, due to the prevalence of this material throughout the mountains of southern Idaho. For this reason, the hydrologic input used to calculate the time dependent radii are the default values presented in Table F-3 of the Idaho Wellhead Protection Plan for mixed volcanic and sedimentary rocks, primarily sedimentary rocks (IDEQ, 1997, p. F-6). An average discharge rate of 563,000 gallons per day was calculated for the PWS springs that have reliable discharge data and used to calculate the fixed-radii for springs with unknown discharge and for springs with a discharge equal to or less than the average rate. The resulting 3-, 6-, and 10-year capture zone radii of 462, 688, and 933 feet were rounded up to 500, 700, and 1,000 feet, respectively. To maintain conservatism, the actual discharge rates were used for springs with discharges greater than the average.

The delineated source water assessment area for the Strawberry Mink Creek Water Association spring can be described as three concentric circles that cover a total area of 63 acres (see Figure 2). The actual data used by WGI in determining the delineated source water area is available from DEQ upon request.

Identifying Potential Sources of Contamination

A potential source of contamination is defined as any facility or activity that stores, uses, or produces, as a product or by-product, the contaminants regulated under the Safe Drinking Water Act. Furthermore, these sources have a sufficient likelihood of releasing such contaminants into the environment at levels that could pose a concern relative to drinking water sources. The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of ground water contamination. Field surveys conducted by DEQ and reviews of available databases identified potential contaminant sources within the delineated areas.

It is important to understand that a release may never occur from a potential source of contamination provided they are using best management practices. Many potential sources of contamination are regulated at the federal level, state level, or both, to reduce the risk of release. Therefore, when a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation. There are a number of methods that water systems can use to work cooperatively with potential sources of contamination, including educational visits and inspections of stored materials. Many owners of such facilities may not even be aware that they are located near a public water supply source.

Contaminant Source Inventory Process

A two-phased contaminant inventory of the study area was conducted in December 2002 and January 2003. The first phase involved identifying and documenting potential contaminant sources within the Strawberry Mink Creek Water Association source water assessment area through the use of Ground Water Under Direct Influence (GWUDI) field surveys and sanitary surveys, computer databases and Geographic Information System (GIS) maps developed by DEQ. The second, or enhanced, phase of the contaminant inventory involved contacting the operator to identify and add any additional potential sources in the delineated areas. The enhanced inventory was completed with the assistance of Clare Christensen. At the time of the enhanced inventory, the operator noted that cattle graze in the 3-year, 6-year, and 10-year TOT zones. Table 1 below includes a list of potential contaminant sources within the delineated area of the spring. Potential contaminant sources within the 0-3 (1A) zone are those sources that are located within 100 feet (sanitary setback) of the drinking water source. Additionally, a map with the spring location, delineated area, and potential contaminant sources are provided with this report (see Figure 2).

Table 1. Strawberry Mink Creek Water Association Spring, Potential Contaminant Inventory

Source Description	TOT Zone ¹ (years)	Source of Information	Potential Contaminants ²
Cattle Grazing	0-3	Enhanced Inventory	IOC, Microbials
Cattle Grazing	3-6, 6-10	Enhanced Inventory	IOC
Mink Creek	0-3 (1A)	GWUDI Survey	IOC, VOC, SOC, Microbials
Mink Creek	3-6, 6-10	GIS Map	IOC, VOC, SOC

¹ TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead; 1A = located within the 100-foot sanitary setback of the spring

² IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Section 3. Susceptibility Analysis

The spring's susceptibility to contamination was ranked as high, moderate, or low risk according to the following considerations: construction, land use characteristics, and potentially significant contaminant sources. The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. Therefore, a high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for the spring is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. Attachment A contains the susceptibility analysis worksheet. The following summaries describe the rationale for the susceptibility ranking.

Spring Construction

Spring construction scores are determined by evaluating whether the spring has been constructed according to Idaho Code (IDAPA 58.01.08.04) and if the spring's water is exposed to any potential contaminants from the time it exits the bedrock to when it enters the distribution system. If the spring's intake structure, infiltration gallery, and housing are located and constructed in such a manner as to be permanent and protect it from all potential contaminants, is contained within a fenced area of at least 100 feet in radius, and is protected from all surface water by diversions, berms, etc., then Idaho Code is being met and the score will be lower. If the spring's water comes in contact with the open atmosphere before it enters the distribution system, it receives a higher score. Likewise, if the spring's water is piped directly from the bedrock to the distribution system or is collected in a protected spring box without any contact to potential surface-related contaminants, the score is lower.

The spring is located in Mink Creek Canyon very close to Mink Creek. A steep bank is above the spring and the Creek. Livestock have access to the area around the spring but according to the 2001 sanitary survey (conducted by DEQ), the spring collection area is fenced off within 100 feet of the spring. The 2001 sanitary survey indicates that the water from the spring is collected in a 10-inch diameter perforated pipe buried in a broken rock formation on the side of a hill. A 10-inch diameter non-perforated pipe attached to the 10-inch diameter perforated pipe exits the hill and runs down the creek for approximately 200 feet to a spring box. The spring box, located on the bank of the creek, has an overlapping, locking, steel cover.

The spring rated moderately susceptible for system construction (see Table 2). Information from the 2001 sanitary survey indicates that the spring is developed to collect water from beneath the ground and the water does not contact atmosphere before going into the spring box. However, there is no diversion above the spring to prevent surface water runoff from contaminating the collection area. Additionally, the owner and control of the land on which the spring is located is unknown, making it difficult to determine if Strawberry Mink Creek Water Association can legally control or limit access to areas surrounding the spring.

Potential Contaminant Source and Land Use

The spring rated moderately susceptible for IOCs (e.g., nitrates, arsenic), and low for VOCs (e.g., petroleum products), SOCs (e.g., pesticides), and microbial contaminants (e.g., bacteria). The Mink Creek not only runs within 50 feet of the spring area but also passes through the 3-year, 6-year, and 10-year TOT zones of the delineation contributing to the potential contaminant source/land use ratings. The cattle grazing outside the fenced spring area in all three TOT zones also contributed to the land use scores.

Final Susceptibility Ranking

A detection above a drinking water standard MCL, any detection of a VOC or SOC, or a confirmed microbial detection at the spring will automatically give a high susceptibility rating to the spring, despite the land use of the area, because a pathway for contamination already exists. Additionally, potential contaminant sources within 100 feet of a spring will automatically lead to a high susceptibility rating. According to the GWUDI field survey, the Mink Creek and a recreation trail that parallels Mink Creek pass within 50 feet of the spring area. According to the water system, the trail is on private property and inaccessible to the public. The trail is overgrown with vegetation due to very little use. The proximity of Mink Creek to the spring resulted in automatically high susceptibility scores for all potential contaminant categories. Having multiple potential contaminant sources in the 0- to 3-year TOT zone (Zone 1B) contribute greatly to the overall ranking.

Table 2. Summary of Strawberry Mink Creek Water Association Susceptibility Evaluation

Susceptibility Scores ¹									
Drinking Water Source	Potential Contaminant Inventory and Land Use				System Construction	Final Susceptibility Ranking			
	IOC	VOC	SOC	Microbials		IOC	VOC	SOC	Microbials
Spring	M	L	L	L	M	H*	H*	H*	H*

¹H = High Susceptibility, M = Moderate Susceptibility, L = Low Susceptibility,

IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

H* = Automatic high susceptibility due to Mink Creek that runs within 50 feet of the spring collection area

Susceptibility Summary

In terms of total susceptibility, the spring rated automatically high for IOCs, VOCs, SOCs, and microbial contaminants due to Mink Creek that runs within 50 feet of the spring collection area. If this corridor is diverted or relocated to an area greater than 100 feet from the spring area, the susceptibility of the system will be lowered. System construction rated moderate and potential contaminant land use scores were moderate for IOCs, and low for VOCs, SOCs, and microbial contaminants.

Total coliform bacteria have been detected in the distribution system several times between November 1992 and February 2001. However, none of these detections have been confirmed. Additionally, no coliform bacteria have been detected in the spring water. Since the water from the spring is chlorinated and then piped directly to the first house instead of to a storage tank, there is some concern (according to the 2001 sanitary survey) that the chlorine has not had sufficient contact time with the water to adequately kill harmful bacteria before use. Chlorine should be in contact with the drinking water for at least 30 minutes to sufficiently eliminate the bacteria.

No SOCs or VOCs have been detected in the spring water. The IOCs fluoride, barium, chromium, and nitrate have been detected in the spring water but at concentrations below the MCL for each chemical, as established by the EPA. Traces of alpha and beta particles (radionuclides) have been detected in the distribution system.

Section 4. Options for Drinking Water Protection

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a “pristine” area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources. If the system should need to expand in the future, new well or spring sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use.

An effective drinking water protection program is tailored to the particular local drinking water protection area. A community with a fully developed drinking water protection program will incorporate many strategies. For the Strawberry Mink Creek Water Association, drinking water protection activities should first focus on correcting any deficiencies outlined in the sanitary survey. The system may want to consider diverting Mink Creek to an area at least 100 feet away from the drinking water source to avoid potential contamination associated with this corridor. If the recreation trail is developed or receives more use, the water system should divert the trail outside the sanitary setback to prevent contamination or impact to the spring source. A diversion terrace above the spring area should be constructed to divert surface water runoff away from the collection area. Additionally, the system needs to conduct two more MPA tests to determine if the spring is influenced by drinking water. The Strawberry Mink Creek Water Association may need to establish communication with landowners to restrict cattle grazing to areas outside of the delineated area and upgradient of the spring area. Homeowners who receive water from the spring should be made aware of the risk of microbial contamination due to the inefficient contact time of the chlorine to the drinking water. Also, the Strawberry Mink Creek Water Association may need to consider installing a storage reservoir or enlarging the pipeline that goes to the houses to alleviate the contact time issue. To learn the most appropriate chlorinating measures for your water system, contact Barbara Jones, the Drinking Water Coordinator for the DEQ Pocatello Regional Office. As land uses within most of the source water assessment area are outside the direct jurisdiction of the Strawberry Mink Creek Water Association, collaboration and partnerships with state and local agencies and industry groups should be established and are critical to success. Educating board members and the public about source water will further assist the system in its monitoring and protection efforts.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan. Public education topics could include household hazardous waste disposal methods and the importance of water conservation. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Franklin Soil and Water Conservation District, and the Natural Resources Conservation Service.

A community must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (e.g., zoning, permitting) or non-regulatory in nature (e.g., good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Pocatello Regional Office of the DEQ or the Idaho Rural Water Association.

Assistance

Public water supplies and others may call the following DEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the DEQ office for preliminary review and comments.

Pocatello Regional DEQ Office (208) 236-6160

State DEQ Office (208) 373-0502

Website: <http://www.deq.state.id.us>

Water suppliers serving fewer than 10,000 persons may contact Melinda Harper (mlharper@idahoruralwater.com), Idaho Rural Water Association, at (208) 343-7001 for assistance with drinking water protection (formerly wellhead protection) strategies.

POTENTIAL CONTAMINANT INVENTORY LIST OF ACRONYMS AND DEFINITIONS

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks.

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLA – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as Superfund is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few heads to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100-year floodplains.

Group 1 Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.)

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5mg/l.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25% of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RCRA – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

References Cited

- Alt, D. D., and D.W. Hyndman, 1989, Roadside Geology of Idaho, Mountain Press Publishing Company, Missoula, Montana, 394 p.
- Bjorklund, L.J., and L.J. McGreevy, 1971, Ground-Water Resources of Cache Valley, Utah and Idaho, State of Utah Department of Natural Resources Technical Publication No. 36, 72 p.
- Communication, March 2003. Discussion with Clare Christensen regarding water system.
- Dion, N.P., 1969, Hydrologic Reconnaissance of the Bear River in Southeastern Idaho, U.S. Geological Survey and Idaho Department of Reclamation, Water Information Bulletin No. 13, 66 p.
- Donato, M.M, 1998, Surface-Water/Ground-Water Relations in the Lemhi River Basin, East-Central Idaho, U.S. Geological Survey, Water-Resources Investigations Report 98-4185, 28 p.
- Graham, W.G., and L.J. Campbell, 1981, Ground water Resources of Idaho, Idaho Department of Water Resources, 100 p.
- Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environment Managers, 1997. "Recommended Standards for Water Works."
- IDAPA 58.01.08, Idaho Rules for Public Drinking Water Systems, Section 004.
- Idaho Department of Environmental Quality. 2000. Source Water Assessment Program Public Water System Questionnaire.
- Idaho Division of Environmental Quality Ground water Program, October 1999. Idaho Source Water Assessment Plan.
- Idaho Division of Environmental Quality. 1995 and 2001. Sanitary Survey for Strawberry Mink Creek Water Association: PWS #6210017.
- Idaho Division of Environmental Quality. 1995. Ground Water Under Direct Influence Field Survey for Strawberry Mink Creek Water Association: PWS #6210017.
- Idaho Division of Environmental Quality, 1997, Idaho Wellhead Protection Plan, Idaho Wellhead Protection Work Group, February.
- Kariya, K.A., D.M. Roark, and K.M. Hanson, 1994, Hydrology of Cache County, Utah, and Adjacent Parts of Idaho, with Emphasis on Simulation of Ground-Water Flow, State of Utah Department of Natural Resources Division of Water Resources Division of Water Rights, 120 p.

- Keely, J.F. and C.F. Tsang, 1983, Velocity Plots and Capture Zones of Pumping Centers for Ground-Water Investigations, *Ground water*, vol. 21, no. 6, pp. 701-714.
- Neely, K.W., 2001, Statewide Monitoring Network, Microsoft Access, Idaho Department of Water Resources.
- Parliman, D.J., 1982, Ground-Water Quality in East-Central Idaho Valleys, U.S. Geological Survey, Open File Report 81-1011, 55 p.
- Ralston, D.R., and E.W. Trihey, 1975, Distribution of Precipitation in Little Long Valley and Dry Valley Caribou County, Idaho, Idaho Bureau of Mines and Geology, Moscow, Idaho, 13 p.
- Ralston, D.R., T.D. Brooks, M.R. Cannon, T.F. Corbet, Jr., H. Singh, G.V. Winter and C.M. Wai, 1979, Interaction of Mining and Water Resource Systems in the Idaho Phosphate Field, Research Technical Completion Report, Idaho Resources Research Institute, University of Idaho, 214 p.
- Safe Drinking Water Information System (SDWIS). Idaho Department of Environmental Quality.
- Todd, D.K., 1980, *Ground water Hydrology*, Second Edition, John Wiley & Sons, New York, 535 p.
- Washington Group International, Inc, April 2002. Source Area Delineation Report for the "None" Hydrologic Province and Southeast Idaho Springs.

Attachment A

Strawberry Mink Creek Water Association

Susceptibility Analysis Worksheet

Susceptibility Analysis Formulas

Formula for Spring Sources

The final spring scores for the susceptibility analysis were determined using the following formulas:

1. VOC/SOC/IOC/ Final Score = (Potential Contaminant/Land Use X 0.6) + System Construction
2. Microbial Final Score = (Potential Contaminant/Land Use X 1.125) + System Construction

Final Susceptibility Scoring:

- 0 - 7 Low Susceptibility
- 8 - 15 Moderate Susceptibility
- ≥ 16 High Susceptibility

1. System Construction

SCORE

Intake structure properly constructed

NO

1

Is the water first collected from an underground source

YES

0

Yes = spring developed to collect water from beneath the ground; lower score

No = Water collected after it contacts the atmosphere; or unknown; higher score

Total System Construction Score 1

2. Potential Contaminant / Land Use - ZONE 1A

IOC
ScoreVOC
ScoreSOC
ScoreMicrobial
Score

Land Use Zone 1A

RANGELAND, WOODLAND, BASALT

0

0

0

0

Farm chemical use high

NO

0

0

0

IOC, VOC, SOC, or Microbial sources in Zone 1A

YES

YES

YES

YES

YES

Total Potential Contaminant Source/Land Use Score - Zone 1A

0

0

0

0

Potential Contaminant / Land Use - ZONE 1B

Contaminant sources present (Number of Sources)

YES

2

1

1

2

(Score = # Sources X 2) 8 Points Maximum

4

2

2

4

Sources of Class II or III leacheable contaminants or

YES

3

2

2

4 Points Maximum

3

2

2

Zone 1B contains or intercepts a Group 1 Area

NO

0

0

0

0

Land use Zone 1B

Less Than 25% Agricultural Land

0

0

0

0

Total Potential Contaminant Source / Land Use Score - Zone 1B

7

4

4

4

Potential Contaminant / Land Use - ZONE II

Contaminant Sources Present

YES

2

2

2

Sources of Class II or III leacheable contaminants or

YES

1

1

1

Land Use Zone II

Less than 25% Agricultural Land

0

0

0

Potential Contaminant Source / Land Use Score - Zone II

3

3

3

0

Potential Contaminant / Land Use - ZONE III

Contaminant Source Present

YES

1

1

1

Sources of Class II or III leacheable contaminants or

YES

1

1

1

Is there irrigated agricultural lands that occupy > 50% of

NO

0

0

0

Total Potential Contaminant Source / Land Use Score - Zone III

2

2

2

0

Cumulative Potential Contaminant / Land Use Score

12

9

9

4

3. Final Susceptibility Source Score

8

6

6

5

4. Final Well Ranking

High

High

High

High